

## PATENT ABSTRACTS OF JAPAN

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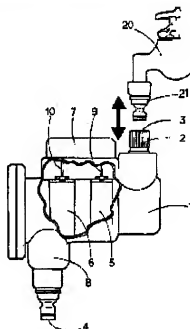
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### (54) SILVER ION WATER GENERATOR

#### (57)Abstract:

**PURPOSE:** To provide a silver ion water generator capable of being easily attached to a tap water cock and enabling the easy replacement of electrodes.

**CONSTITUTION:** A silver ion water generator is equipped with a generator main body 1, a cock attaching port 3 provided with a cock attaching and detaching jig 2 for attaching the main body to a tap water cock 20 in a detachable manner, a silver ion water discharge port 4 discharging made silver ion water, the cathode silver electrode 5 arranged on the upstream side of the passage allowing the cock attaching port 3 to communicate with a silver ion water discharge port 4, the anode silver electrode 6 arranged on the downstream side of the passage and a control part 7 allowing a current to flow across both silver electrodes 5, 6. When a current is supplied across both silver electrodes 5, 6, silver of the anode silver electrode 6 is dissolved to precipitate  $Ag^+$  and silver ion water is made from tap water to be discharged from the silver ion water discharge port 4.



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CLAIMS

[Claim(s)]

[Claim 1]A silver ion water generation machine comprising:

A faucet mounting mouth which formed a faucet attachment-and-detachment implement for attaching to a waterworks faucet removable.

A silver ion water outlet which discharges silver ion water generated from tap water.

The cathode side silver electrode arranged in a channel which opens a faucet mounting mouth and a silver ion water outlet for free passage, and the anode side silver electrode.

A control section which sends current through the silver inter-electrode by the side of a cathode and an anode.

[Claim 2]The silver ion water generation machine according to claim 1, wherein said control section is what changes periodically the direction of current sent through the silver inter-electrode by the side of a cathode and an anode.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application]This invention relates to the silver ion water generation machine of the waterworks faucet clamping die which changes tap water into silver ion water.

[0002]

[Description of the Prior Art]The silver ion water by the electric dissolution is used for disinfection, preservation, etc. of drinking water in the Soviet Union, European countries, etc. for many years. It has the high disinfection in low concentration, and a wide area antibacterial action, and has the preservability superior to hypochlorite, ozone, and ultraviolet rays.

[0003]

[Problem(s) to be Solved by the Invention]Although it is silver ion water which has such an outstanding effect, the actual condition is that the small silver ion water generation machine which can be simply attached to a waterworks faucet unlike the water purifier which has spread widely is not realized. Therefore, this invention was made paying attention to such the actual condition, it can attach to a waterworks faucet easily, and an object of this invention is to provide easily the silver ion water generation machine which can exchange electrodes.

[0004]

[Means for Solving the Problem]This invention is characterized by a silver ion water generation machine comprising the following, in order to attain said purpose.

A faucet mounting mouth which formed a faucet attachment-and-detachment implement for attaching to a waterworks faucet removable.

A silver ion water outlet which discharges silver ion water generated from tap water.

The cathode side silver electrode arranged in a channel which opens a faucet mounting mouth and a silver ion water outlet for free passage, and the anode side silver electrode.

A control section which sends current through the silver inter-electrode by the side of a cathode and an anode.

[0005]

[Function]This silver ion water generation machine can be set to a waterworks faucet by attaching a faucet mounting mouth to a waterworks faucet with a faucet attachment-and-detachment implement. And if tap water is poured in the state where made the power supply of the generation machine one and it energized to the silver inter-electrode by the side of a cathode and an anode, tap water will flow into the anode side silver electrode for example, from the cathode side silver electrode. At this time, tap water by the well-known electrolysis of water ( $H_2O \rightarrow H^+ + OH^-$ ). From negative ion, an electron is taken, the anode side silver electrode oxidizes, the electron of a positive ion is received, current flows into both silver inter-electrode, the silver of the anode side silver electrode dissolves,  $Ag^+$  deposits, silver ion water is generated, and the cathode side silver electrode comes out of a silver ion water outlet.

[0006]

[Example]Hereafter, the silver ion water generation machine of this invention is explained based on an example. The appearance perspective view of the generation machine concerning the one example is shown in drawing 1, and a fracture side view is shown in drawing 2 in part. The faucet mounting mouth 3

which formed the faucet attachment-and-detachment implement 2 for attaching this generation machine to the generation vessel body 1 and the waterworks faucet 20 removable. The silver ion water outlet 4 which discharges the silver ion water generated from tap water. It has the control section 7 which sends current between the anode side silver electrode (cell) 6 arranged at the downstream of the cathode side silver electrode (cell) 5 arranged at the upstream of the channel (not shown in particular) which opens the faucet mounting mouth 3 and the silver ion water outlet 4 for free passage, and a channel, and the silver electrode 5 and 6 by the side of a cathode and an anode.

[0007]The faucet attachment-and-detachment implement 2 is attached to the connecting member 21 provided in the waterworks faucet 20 side, and the WATTATCHI coupling mechanism is constituted from this example by the faucet attachment-and-detachment implement 2 and the connecting member 21. What is necessary is just to use what is widely used, for example with the usual water purifier etc. (an attachment type and a screwing type) as this one-touch coupling mechanism. On the other hand, the same one-touch coupling 8 is formed also in the silver ion water outlet 4. It is connected with the leads 9 and 10 with the respectively suitable silver electrodes 5 and 6 by the side of the control section 7, a cathode, and an anode. AC adapter 11 is connected to the control section 7, and it is considered as the power supply by inserting this AC adapter 11 in a home electric socket (commercial power). The control section 7 has the indicator lamp 7a, and working, i.e., while energizing between both the silver electrodes 5 and 6, the indicator lamp 7a turns it on.

[0008]The silver ion water generation machine constituted in this way attaches the connecting member 21 to the waterworks faucet 20, and is attaching the faucet attachment-and-detachment implement 2 of the faucet mounting mouth 3 to the connecting member 21, and can set the generation vessel body 1 to the waterworks faucet 20. Here, if a power supply is made one, it will energize between both the silver electrodes 5 and 6, for example, current will flow into the anode side silver electrode 6 from the cathode side silver electrode 5, and silver ion water will be generated from tap water, but the generating mechanism of silver ion water is shown in drawing 3. As each reaction is indicated to drawing 3, the well-known electrolysis of water ( $H_2O \rightarrow H^+ + OH^-$ ) occurs in the process in which the tap water which advanced from the faucet mounting mouth 3 flows into the anode side silver electrode 6 from the cathode side silver electrode 5. By this electrolysis of water, from negative ion, an electron is taken and the anode side silver electrode 6 oxidizes. The electron of a positive ion is received, current flows between both the silver electrodes 5 and 6, the silver of the anode side silver electrode 6 dissolves,  $Ag^+$  deposits, silver ion water is generated, and the cathode side silver electrode 5 comes out of the silver ion water outlet 4.

[0009]In the above silver ion water generation machines, the silver generated amount is as follows. The precipitation amount by electrolysis of fundamental silver is expressed with a following formula on the basis of Faraday's law.

$$\text{電解によるAg生成量} = 108 \times \frac{A (\text{アンペア}) \times t (\text{秒})}{9.65 \times 10^4} \quad (g)$$

In the electric dissolution, although there are  $Cl^-$ ,  $SO_4^{2-}$ ,  $S^{2-}$ ,  $NH_4^+$ , aluminum<sup>3+</sup>, Fe<sup>2+</sup>, and Fe<sup>3+</sup> as ion to which silver current efficiency is reduced, if it is common tap water and is no less than 85 to 90% as efficiency, it is enough. Since an affix generates to the anode side silver electrode 6 with energization and silver generating efficiency falls, it is desirable to change periodically the direction of the current energized between both the silver electrodes 5 and 6 by the control section 7.

[0010]In actual use, the dissolution current sent between both the silver electrodes 5 and 6 is made into 20-mA constant current, and concentration of deposit silver is made into 0.1 mg/l by underwater [ of 10 l/m ]. When exchange of a silver electrode is needed by deposit of silver, the indicator lamp 7a (for example, blink) shall report the exchange time. Of course, exchange of a silver electrode can be easily performed, if the generation vessel body 1 is opened. Incidentally, the exchange time of a silver electrode is as follows considering treated water as 10 l/min and use of 8 hours per day.

[0011]

The conductivity (mS/cm) life of water (Mon.)

0.10 20.15 40.20 50.25 7 — here, the antibacterial action of silver ion water is explained. Ag adheres to the bacteria which are minus because of a positive ion, intracellular [ the ] is permeated, the main enzyme systems of a cell are decomposed, it is blocking a cell enzyme and a cell becomes extinct. Depending on

Ag concentration, concentration can check these antibacterial properties from 0.05 mg/l. Antibacterial properties have an effect in *Escherichia coli*, the *Sal Morella bacillus*, a dysentery bacillus, *Vibrio cholerae*, etc. The silver ion water which has such antibacterial properties is used for preservation water, such as drinking water in the marine vessel under voyage, drinking water of the pilot in the spacecraft under space flight, water of a pool, and medicine, etc. Even if it takes in about 0.1–2 mg/l of silver concentration on actual use, it turns out that toxicity is not given to growth of a living body cell and it is uninfluential on a human body in any way.

[0012]The antibacterial effect of silver ion water is common knowledge as described above, but it shows drawing 4 – drawing 7 an example. Drawing 4 is a graph which expresses the extinction state of the *Escherichia coli* by each concentration of silver ion water, and shows the relation between time and the number of the bacteria in 1 ml.

Even when it is 0.05 mg/l with the lowest silver concentration, if about 100 minutes pass, it turns out that bacteria become extinct mostly.

Drawing 5 is a graph which expresses the bacteria composition in the water (usual water and silver ion water) under voyage, and shows the relation between daily and a microbial count.

If it will pass on about the 70th in the case of usual water, even if 160 days or more will pass, with silver ion water, a microbial count will hardly increase from the beginning to a microbial count increasing rapidly.

[0013]Drawing 6 is 40 mA of current, and a graph which shows the relation of the time in conditions and the number of general bacteria through which it circulates by flow 25 l/min.

It turns out that bacterium do not increase in number even if time passes in the silver ion water obtained on the condition.

Drawing 7 is a graph which shows the relation between 40 mA of current, and the time in conditions and the number of *Escherichia coli* through which it circulates by flow 25 l/min.

Not being generated by *Escherichia coli* is understood with the obtained silver ion water.

[0014]As for this invention, it is needless to say that it is not limited to the above-mentioned example. In the above-mentioned example, although the cathode side silver electrode is arranged to the upstream of a channel and the anode side silver electrode is arranged to the downstream of the channel, whether arrange the anode side silver electrode to the upstream of a channel, and it arranges the cathode side silver electrode to the downstream or it carries out a stream for reverse in the above-mentioned example, an equivalent operation effect is completely obtained.

[0015]

[Effect of the Invention]As explained above, the silver ion water generation machine of this invention, Since the attachment and detachment of the generation vessel body of the structure which energizes to the cathode side and the anode side silver inter-electrode, and generates silver ion water from water on a waterworks faucet are enabled, It not only can obtain easily the silver ion water in which conventionally outstanding antibacterial properties, sterilization, and a storage effect are known from tap water, but exchange of an electrode can be performed easily, and the use is wide range and dramatically useful.

JAPANESE [JP,08-192161,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION  
TECHNICAL PROBLEM MEANS OPERATION EXAMPLE DESCRIPTION OF DRAWINGS  
DRAWINGS

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1]It is an appearance perspective view of the generation machine concerning one example.

[Drawing 2]It is a partial fracture side view of the generation machine of the example.

[Drawing 3]It is a figure showing the generating mechanism of the silver ion water in the generation machine of the example.

[Drawing 4]It is a graph which shows the relation of the time and the number of Escherichia coli by each concentration of silver ion water.

[Drawing 5]It is a graph which shows the relation of daily and the microbial count in the usual water and silver ion water under voyage.

[Drawing 6]It is a graph which shows the relation of the time and the number of general bacteria in silver ion water.

[Drawing 7]It is a graph which shows the relation of the time and the number of Escherichia coli in silver ion water.

[Description of Notations]

- 1 Generation vessel body
- 2 Faucet attachment-and-detachment implement
- 3 Faucet mounting mouth
- 4 Silver ion water outlet
- 5 Cathode side silver electrode
- 6 Anode side silver electrode
- 7 Control section
- 20 Waterworks faucet

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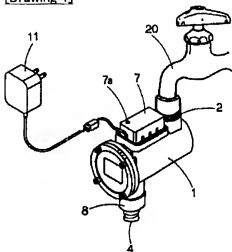
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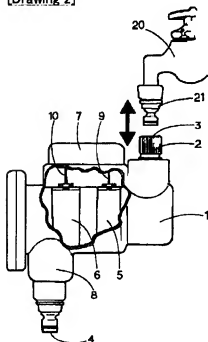
**DRAWINGS**

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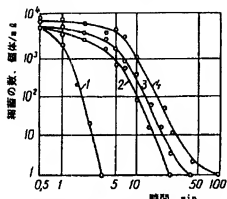
[Drawing 1]



[Drawing 2]

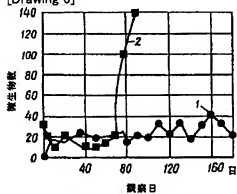


[Drawing 4]



時間, min  
1 - 1.0; 2 - 0.5; 3 - 0.2; 4 - 0.05 mg/g  
出発汚染度は  $10^4$  個体/μg

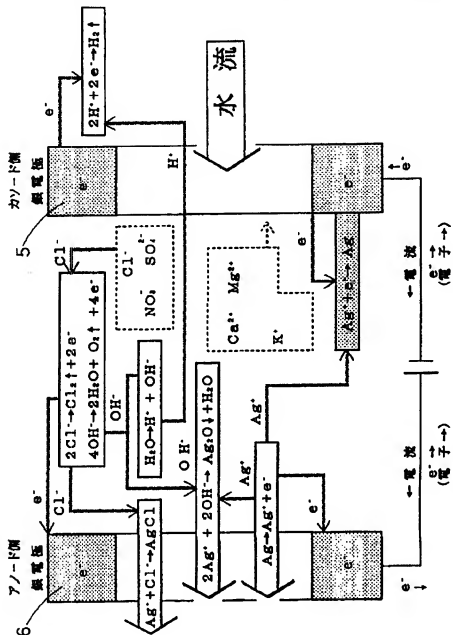
[Drawing 5]



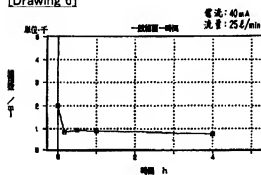
1 - 餌イオン水; 2 - 対照水

[Drawing 3]

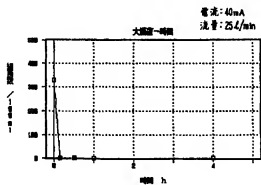




**[Drawing 6]**



[Drawing 7]



[Translation done.]